

REMARKS

In reply to the Office Action of June 13, 2006, Applicant submits the following remarks. Claims 1, 19 and 20 have been amended. Claim 21 is new. Amendments to the claims and the new claim are supported at least by FIGs. 4-5 and the accompanying text. Applicant respectfully requests reconsideration in view of the foregoing amendments and these remarks.

Section 102 Rejections

Claims 1-5, 13 and 18-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by WO 02/098608 ("Kajiwara"). The applicant respectfully traverses, at least in part based on the amendments to the claims.

Kajiwara describes a retaining ring 170 with a contoured lower surface 210 having an annular groove or recess 215 therein (FIGS. 11A, 11B, 12, page 17, lines 10-24). The annular grooves have a curved or hemispherical cross-section.

Amended claim 1 is directed to a retaining ring having channels, each channel having a curved section defining a rounded ceiling and substantially vertical side walls, wherein a distance between the side-walls is constant from the bottom surface to the curved section and the side-walls have a length that is greater than the depth of the curved section.

Kajiwara fails to suggest or disclose channels that have a curved section defining a rounded ceiling and substantially vertical side walls, wherein a distance between the side-walls is constant from the bottom surface to the curved section. Kajiwara describes grooves that have curved or hemispherical cross sections. A hemisphere does not have vertical side walls that have a distance therebetween that is constant for any distance. Any cross section of a hemisphere has opposing walls that converge or diverge from one another. Similarly, at one depth of a groove with a curved cross section, the distance to an opposing wall is not equal to the distance to an opposing wall at a different depth of the groove. Therefore Kajiwara fails to anticipate claim 1 as amended. Claims 2-5, 13 and 18 depend from claim 1 and are similarly not anticipated by Kajiwara.

Claim 19 is directed to a carrier head having a retaining ring with channels as described in claim 1. Claim 20 is directed to a method of polishing using a retaining ring with channels as

described in claim 1. For at least the same reasons as provided above with respect to claim 1, applicant submits that claims 19-20 are not anticipated by Kajiwara for at least the same reasons as presented with respect to claim 1.

Section 103 Rejections

Claims 9 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kajiwara. Claims 10-12 and 14-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kajiwara in view of DeMeyer. Applicant respectfully disagrees.

Each of claims 9-12 and 14-17 depend from claim 1. DeMeyer fails to suggest or disclose channels that have a curved section defining a rounded ceiling and substantially vertical side walls, wherein a distance between the side-walls is constant from the bottom surface to the curved section. For at least this reason, no *prima facie* case of obviousness has been made with respect to claims 9-12 and 14-17 in light of the amendment to claim 1.

Prior Art Not of Record

The Examiner notes that WO 2004/033152 ("Easter") was not relied upon, but is considered pertinent to applicant's disclosure. Easter shows channels with semicircular channels 38 (FIG. 3, page 5, lines 5-12). Alternatively, the channels can have an arcuate profile. Applicant submits that Easter also does not teach channels that have a curved section defining a rounded ceiling and substantially vertical side walls, wherein a distance between the side-walls is constant from the bottom surface to the curved section and the side-walls have a length that is greater than the depth of the curved section.

Examiner Interview

Applicant thanks the Examiner for granting the courtesy of a telephone conference with Applicant's representative on August 17, 2006. Claim 1 and Kajiwara were discussed.

During the telephone conference, the Examiner mentioned that a change in shape of a channel in a retaining ring would be merely a design choice that would not be afforded patentable weight. Applicant respectfully disagrees that the change in the shape of the channels in a retaining ring is merely a design choice. As noted in Applicant's specification, the channels

“permit a polishing fluid, such as slurry, which can include abrasives or be abrasive-free, to flow underneath the retaining ring to the substrate” (page 4, lines 12-18). The cross section of the channels affects the amount of slurry that is able to flow during the polishing process. As a retaining ring is used to polish wafers, the retaining ring material wears away. In a retaining ring with grooves that have curved or hemispherical cross-sections, the wearing of the bottom of the retaining ring decreases the width of the channel, which also decreases the amount of slurry flow under the retaining ring. In a retaining ring with channels having vertical side walls, wherein a distance between the side-walls is constant from the bottom surface to the curved section and the side-walls have a length that is greater than the depth of the curved section, the width of the channels does not change as the retaining ring wears away until the ring is worn to the extent that the depth of the curved portion is reached. Because the width of the channel is not changed over time, wafer to wafer polishing uniformity is more likely to be maintained than in a retaining ring with curved or hemispherical channels. Inter-wafer polishing uniformity is a goal in semiconductor processing, thus the shape of the channel is not merely one of design choice, but has a functional aspect.

Information Disclosure Statement

Applicant respectfully requests that the Examiner initial the PTO-1449 form submitted July 11, 2006.

No fee is believed to be due. If, however, there are any unforeseen charges or credits, please apply them to Deposit Account No. 06-1050.

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Respectfully submitted,

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